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US-A- 4 081 301  
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## Description

### Multiple strand elastic means

The present invention relates to a new and improved multiple strand elastic means. More particularly, the present invention relates to a means for adhering multiple strands of elastic in a product such as a disposable diaper product.

Disposable diaper products have been known for some time. A disposable diaper product generally consists of a liquid-impermeable backing sheet, a liquid-permeable facing sheet, and an absorbent core laminated between the facing and backing sheets. Initially, in many of these products the absorbent core consisted of « wadding » or plies of tissue. Diapers utilizing such an absorbent core are disclosed in US-RE-26,151.

The wadding type of batt or core was replaced for the most part by an improved absorbent batt which generally comprises what is termed « fluffed wood pulp fibers ». This absorbent batt which is a layer of individualized wood pulp fibers has substantial thickness. A diaper which incorporates such a fluffed wood pulp absorbent batt is described in US-RE 2,788,003. This diaper had improved absorbent capacity and somewhat better containment than a diaper using a wadding layer. Also, the fluffed wood pulp layer is quite soft, flexible, and conformable, and hence produces an improved diaper as to feeling and softness.

Even though the fluffed wood pulp absorbent batts improve the capacity of the disposable diaper, they remain quite thick. Such thickness provides a problem with respect to containment of the liquid, and thus the clothes of the infant may become wet and/or stained.

One answer for leaking diapers provided in the marketplace has been the elastic-leg diapers or stretch diapers. Though these diapers provide no better absorbent batt than previous diapers, they have indicated improved containment of liquid. Such diapers are disclosed and described in US-A-3,860,003 ; US-A-4,050,462 ; US-A-4,324,245 ; and US-A-4,430,086. Though the containment features are better than the prior art products, the elasticized products of these patents and those in the marketplace at the present time fit more tightly permitting less air circulation. Frequently, this can become irritating to the skin and the tighter the elastic or the more close fitting the diaper, the greater the irritation. This is especially true adjacent the area where the elastic leg portion of the product contacts the wearer.

Furthermore, the adherence of the elastic to the backing, or facing, or both, has been a problem in the art. For instance, US-A-4,081,301 attempts to solve the problem of adhering elastic by intermittently applying adhesive to the elastic, adhering the elastic member to the facing or the backing of a disposable diaper product, and then severing the elastic in the unadhered portion. In this method and others known similar to it, it has been

deemed necessary to provide adhesive along substantially the entire length of the elastic member where it is desirable to adhere the elastic. The addition of adhesive along the stretched portion of the elastic provides an additional thickness to the elastic and at least partially interferes with the gathering power of the elastic member.

US-A-4,333,782 discloses a laminated structure, for use for instance in a disposable diaper, having a marginal area with gathered and ungathered portions which provide an improved fit about a portion of the human body. The laminated structure comprises an elastic member disposed between first and second substrates of flexible gatherable material. The elastic member comprises a plurality of longitudinally extending elastic elements with the elements transversely connected over a portion of their length to define apertures. An end portion of the member comprises only longitudinally extending elements. The first and second substrates are secured together through at least some of the apertures.

According to the present invention, there is provided an elastic means for a disposable diaper comprising multiple, substantially parallel, strands of stretched elastic adhered between two layers of fabric, characterized in that the elastic is adhered between the two fabric layers by at least one sinusoidal adhesive line.

The present invention provides a new and improved means for adhering multiple strands of elastic in a disposable diaper product. The new means of adhering the elastic saves a large amount of adhesive, provides a very soft gathering zone, provides uniformity in the gathering of the elastic member, and couples the motion of the surrounding fabric to the elastic. Furthermore, it is particularly suitable for providing breathability in the elastic zone.

It has been discovered that multiple strands of elastic in a disposable diaper product to gather the leg band area are preferable to a single strand of elastic. To adhere each strand over its entire length provides the disadvantages discussed heretofore. It has been discovered that the use of a single sinusoidal adhesive line provides a highly desirable result. A sinusoidal adhesive line is one which is wavy, or undulates, and is not a straight line of adhesive. The sinusoidal adhesive line may adhere more than one elastic strand or each elastic strand may have its own sinusoidal adhesive line. In either case, the advantages mentioned heretofore are achieved.

In the accompanying drawings :

Figure 1 is a plan view of a disposable diaper exhibiting one embodiment of the present invention, especially shown in the portion broken away for clarity ;

Figure 2 is a plan view of one embodiment of the present invention ;

Figure 3 is a plan view of another embodiment

of the present invention ;

Figure 4 is a plan view of a further embodiment of the present invention ; and

Figure 5 is a plan view of a still further embodiment of the present invention.

Referring to Figure 1, a disposable diaper 10 is shown. The diaper has a backing sheet 12 and a facing sheet 18. The backing and facing sheets extend beyond the absorbent core which in this case consists of a liquid barrier 14 and an absorbent core 16. In the broken away portion of the drawing, it can be seen that the elastic strands 13 are held in place by the sinusoidal adhesive line 15. In this instance, a sinusoidal line 15 is placed on the backing sheet 12 and the elastic strands placed on top of the glue line after which the facing sheet 18 is adhered to the backing sheet by the portions of the sinusoidal adhesive line which are not beneath the elastic strands. In this manner, the adhesive line serves a dual purpose, i. e. to adhere the elastic strands to the backing sheet 12 and to adhere the facing sheet 18 to the backing sheet as well. Tape tabs 17 and 19 are affixed in each corner of the diaper product at the back waist line to secure the diaper product about the body of the infant.

Figure 2 depicts strands of elastic 23 adhered to a desirable substrate by a sinusoidal adhesive line 25. The « pitch » of a sinusoidal line is the distance between two adjacent peaks of the line. In Figure 2, the pitch is denoted by « p ». In the instance in Figure 2, the pitch might be as low as 0.76 cm (0.3 inch).

Figure 3 depicts a sinusoidal adhesive line 35 suitable for adhering elastic strands 33 which has a pitch which may be as high as 3.81 cm (1.5 inch) or more.

Figure 4 shows two sinusoidal lines 45 used to adhere multiple elastic strands 43. In this instance each of the lines 45 attaches two strands of elastic.

Figure 5 depicts the situation wherein a sinusoidal adhesive line 55 is used on each strand of elastic 53 that is to be adhered.

The elastic means provided by the present invention provides a soft, gathering region at the leg band or if desired the waist band of a disposable diaper product. It has been noted that when the elastic means of the present invention is used, there are substantially no red lines depicting irritation made on the skin of the infant wearing the disposable diaper product. It is also noted that the gathering provided by the elastic means is uniform and couples the motion of the surrounding fabric to the elastic. This provides for a more complete gasket about the leg of the infant without the disadvantage of creating lines in the infant's skin. The gathering pattern provided by the elastic means of the present invention is changed from that normally seen in other commercial products such that more of the fabric is in contact with the infant's skin thus providing both a better gasket and a softer gasket without marking the skin of the infant. Because the gasket is formed by fabric instead of elastic, the leg band is

much more breathable.

The elastic means of the present invention is preferably placed between two layers of fabric in the margins of a disposable diaper product. The term « fabric » is used herein to include fabrics, whether they be woven or nonwoven, films, whether they be continuous or breathable, netting, or scrims.

It had been found in order to satisfactorily adhere four single strands of elastic in the leg band of a disposable diaper product, it was necessary to adhere the elastic strands at each end by use of a mass of adhesive going across the space between the strands as well as encompassing the strands, which mass of adhesive needed to be at least a 0.635 cm (1/4 inch) in width. It was then observed in order to retain a sufficient amount of the elastic power of each strand, it was better not to adhere the strand's entire length but rather to place adhesive on each side of the strand to adhere the backing and facing together thereby providing channels within which the elastic would lie. By use of this method, the strands were held sufficiently in place that a gathering effect was achieved. In order to adequately secure four strands of elastic which are approximately 0.81 mm (0.032 inch) in width and are extended 100 percent, it is found necessary to use 0.655 grams of hot melt adhesive per diaper. Four strands of elastic are held in place by using an adhesive mask at the end of the elastic strands which is about 1.27 cm by 0.32 cm (1.2 inch by 1/8 inch), and five adhesive lines between the elastic bands to provide the channels within which the elastic bands would lie.

In the present invention, the elastic strands, generally not more than 0.635 cm (1/4 inch) in width, may be placed close together, i. e., about 0.81 mm (0.032 inch) apart up to about 0.635 cm or 1.27 cm (1/4 inch or 1/2 inch) or more apart.

The sinusoidal glue line extends at least about 1.59 mm (1/16 inch) up to about 1.27 cm (1/2 inch) or more beyond the outside elastic strand. This extension assures adherence of the facing to the backing just outside the outermost elastic strand.

A comparative example of the diaper of the present invention to the product just discussed above is as follows. This example is not intended to be limiting in any way and extensions and modifications thereof without departure from the scope of the invention will become apparent from this example.

#### Example

In this example, hot melt adhesive manufactured by Findley Adhesives and identified as Product No. 691-336 is used. Any suitable adhesive can be used in the present invention. A diaper product, approximately 45.72 cm (18 inches) in length, is made in accordance with that shown in Figure 1. The elastic elements, four on each side of the absorbent core, are each 29.21 cm (11 1/2 inches) in length. The elastic strands in their relaxed state are approximately

14.6 cm (5 3/4 inches) in length. In this example, 0.0012 g/cm (0.003 grams per inch) of adhesive line are placed in a sinusoidal pattern wherein four lines are used as shown in Figure 5. The lines have a pitch of approximately 1.52 cm (0.6 inch) and have a 3.17 mm (1/8 inch) pattern width. The amount of adhesive required for each diaper is 0.313 gram. This is true in spite of the fact that 8 lines of adhesive extending at least 29.21 cm (11.5 inches) have been provided.

In the instance wherein one sinusoidal line is used to adhere two strands of elastic in place and each line has a pitch of 1.27 cm (1/2 inch), approximately 0.224 grams per diaper of adhesive is used. Wherein a single sinusoidal line of adhesive for each four strands of elastic is used in the diaper and the glue line has a 2.54 cm (one inch) pitch, the amount of adhesive used is approximately 0.128 gram per diaper.

It can be seen from the above that the use of sinusoidal lines to adhere multiple strands of elastic in a diaper product requires considerably less adhesive as well as gaining all of the other advantages heretofore disclosed. Furthermore, the sinusoidal type glue line permits use of a very fine or narrow glue line because the two layers of fabric immediately adjacent the elastic are adhered to each other.

From the foregoing it will be observed that numerous variations and modifications may be effected without departing from the scope of the novel concept of this invention.

#### Claims

1. An elastic means for a disposable diaper (10) comprising multiple, substantially parallel, strands (13) of stretched elastic adhered between two layers of fabric (12, 18), characterised in that the elastic (13) is adhered between the two fabric layers (12, 18) by at least one sinusoidal adhesive line (15).

2. The elastic means of claim 1, wherein said adhesive line (15) adheres more than one elastic strand (13).

3. The elastic means of claim 1, wherein said adhesive line (15) adheres only one elastic strand

(13).

4. The elastic means of any one of claims 1 to 3, wherein said adhesive line (15) is provided by a hot melt adhesive.

#### Patentansprüche

1. Elastisches Mittel für eine Wegwerfwindel (10), umfassend eine Mehrzahl von im wesentlichen parallelen Fäden (13) aus gestrecktem Gummiband, welche Fäden zwischen zwei Schichten (12, 18) aus Stoff eingeklebt sind, dadurch gekennzeichnet, daß das Gummiband (13) zwischen den zwei Schichten (12, 18) aus Stoff durch wenigstens eine sinusförmige Klebstofflinie (15) eingeklebt ist.

2. Elastisches Mittel nach Anspruch 1, wobei die genannte Klebstofflinie (15) mehr als einen elastischen Faden (13) verklebt.

3. Elastisches Mittel nach Anspruch 1, wobei die genannte Klebstofflinie (15) nur einen elastischen Faden (13) verklebt.

4. Elastisches Mittel nach einem der Ansprüche 1 bis 3, worin die genannte Klebstofflinie (15) aus einem Heißschmelzkleber besteht.

#### Revendications

1. Un élément élastique pour une couche jetable (10) comprenant des brins multiples, substantiellement parallèles, d'élastique (13) tendu, collé entre deux épaisseurs de tissu (12, 18), caractérisé en ce que l'élastique (13) est collé entre les deux épaisseurs de tissu (12, 18) par le biais d'au moins une ligne adhésive sinusoïdale (15).

2. L'élément élastique selon la revendication 1, dans lequel ladite ligne adhésive (15) colle plus d'un brin élastique (13).

3. L'élément élastique selon la revendication 1, dans lequel ladite ligne adhésive (15) colle seulement un brin élastique (13).

4. L'élément élastique selon l'une des revendications 1 à 3, dans lequel ladite ligne adhésive (15) est prévue sous forme d'adhésif fondu à chaud.

FIG-1

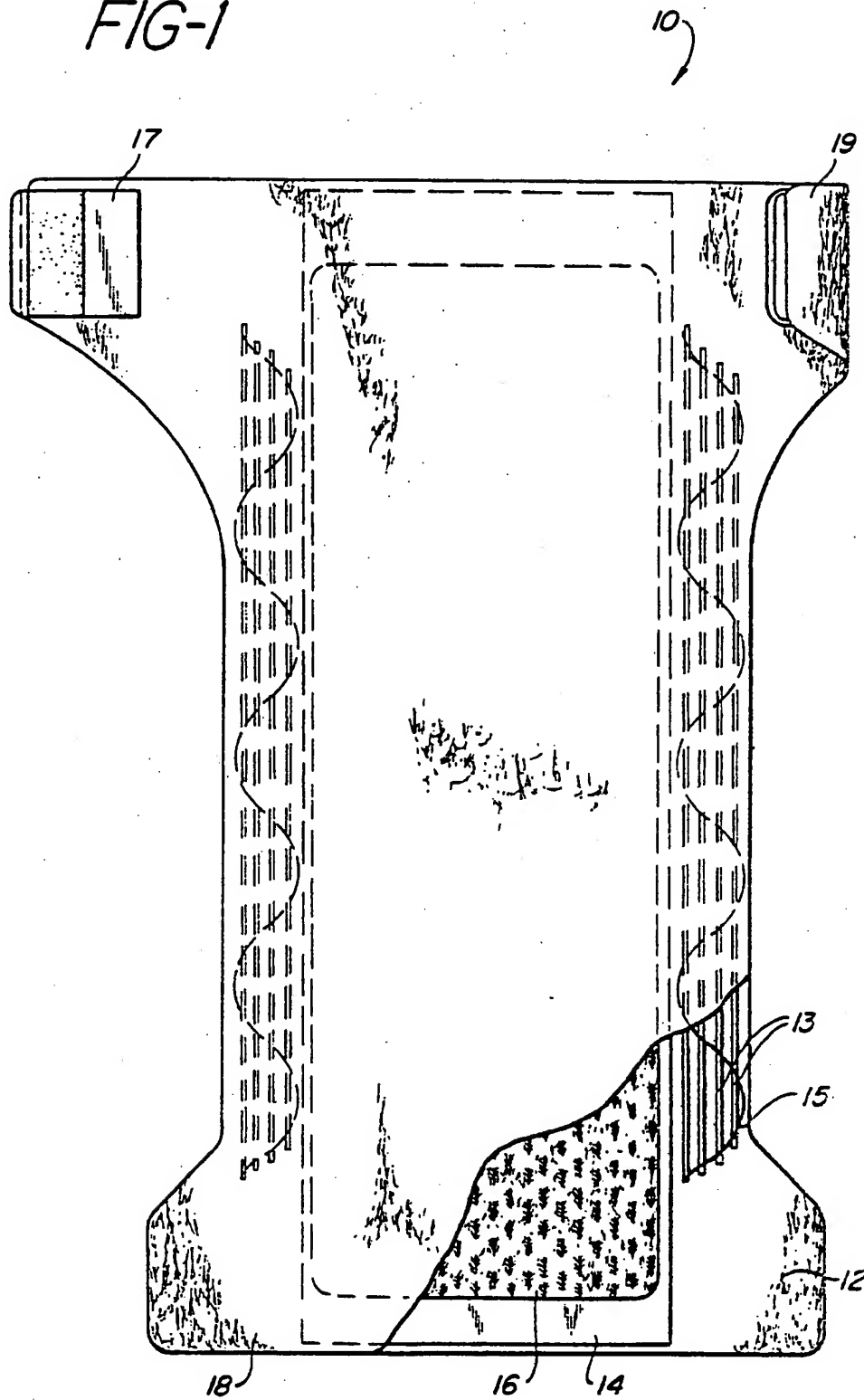


FIG-2    FIG-3    FIG-4    FIG-5

